53. *Calamagrostis Canadensis.* Along the mountain brooks.
54. *Poa laxa,* Hænk. On the "Saddleback".
55. *Aira flexuosa* L. Common.
56. *Hierochloa alpina* R. & S. On the "Saddleback".
57. *Lycopodium Selago* L. Abundant along the "Narrows", etc.
58. *Lycopodium annotinum* var. *pungens.* On the Eastern Ridge.

NOTE.— The foregoing article was written in 1874; the nomenclature therefore conforms to that of the 5th edition of Gray's Manual.— F. L. S.

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Noteworthy anatomical and physiological researches.

Observations on the protection of buds in the tropics.[1]

While no little attention has been given to the way in which buds are protected from the cold of rigorous climates it would appear that similar adaptations to guard the delicate parts of plants from the hot and dry atmosphere and the direct rays of the sun in tropical regions have been the occasion of much less study, although this is quite as distinct and considerable a field of research. Treub called attention to the need of such adaptations in 1887, and gave several instances of their occurence. The paper of Potter here summarized is, however, the first to give any satisfactory classification of the various methods employed by different plants, so far as the writer is able to discover. "For the purpose of description," says Potter, "it is convenient to consider these special protective contrivances under four heads," as follows:

1. Protection by means of stipules. 2. Protection by means of gum. 3. Protection by position assumed when young. 4. Protection by shade from older leaves.

Species of Artocarpus, Heptopleurum, Canarium, Wormia and Sarcocephalus are cited as examples of the first class. In all these the stipules form a hood over the young leaves and thus protect them from the too scorching rays of the sun. Of the second class Tabernæmontana is mentioned as particularly interesting. In at least one species of this genus the young leaves develop in a four-sided chamber, the walls of

[1] M. C. POTTER: Journ. Linn. Soc. XXVIII, 343–352.

which are, on two sides, older leaves, and on the other two, thin layers of gum. As an instance of the third case the orthotropic position of folded palm-leaves is mentioned. It would scarcely seem permissible to put forward a case like this as an instance of special adaptation, for, as is well known, it is generally true that rolled-up dorsiventral organs are inclined to take the erect position. Undoubtedly, nevertheless, such a position is of decided value to the young leaves and parts of leaves for it clearly serves to put them in the least exposed position with reference to the incident rays of a hot tropical sun. Many examples of this manner of protection may be found among the monocotyledons in particular. The last method of protection is a favorite one and is by no means confined to plants growing in the tropics. Uvaria, Gossypium and Begonia are the examples cited by Potter. In each of these genera when a leaf has become old enough to resist the hot rays of the sun and the unfavorable conditions of the atmosphere it is quite natural that it should be utilised as a protecting shield for the immature leaves which are less able to withstand conditions varying so widely from the optimum.

Some good figures are given in the plates which accompany the article, and, with the exception of the third, each class is illustrated.—CONWAY MACMILLAN.

Vitality of ferns.

Wittrock publishes in a recent paper[1] a series of observations, which form together a very valuable contribution to the biology of the ferns. It deals especially with the ability of fern-leaves to imbibe water and to become fresh after a long period. Several species are described as showing this power and the author has observed that a special form of the frond is characteristic of each species, when naturally dried. Most interesting, however, is the chapter in which the author demonstrates the ability of the ferns to be revivified after being kept dry for several months or even years and after being preserved as herbarium specimens! Professor Wittrock has taken, for instance, several species from the Pringle-collections immersed them in water for some minutes and then planted them in moist sandy soil, keeping them carefully in shade and under an ordinary glass globe. The ferns became perfectly

[1] V. B. WITTROCK: De filicibus observationes biologicae. Acta horti Bergini, vol. 1. no. 8. Stockholm, 1891.